Conquering the basement from hell

By laying out the walls directly on the footing, a contractor tackles a nightmare foundation job requiring complex corner angles and varying wall thicknesses, and wins an award for the effort

BY KIM BASHAM

Few contractors would take on a large, elaborate foundation project requiring corner angles of 90, 135, 142, and 153 degrees and wall thicknesses of 8, 10, 12, 14, 16, and 34 inches. But these daunting requirements didn't unnerve Bontrager Concrete Specialties Inc., Nappanee, Ind., when the contractor was asked to build such a foundation for a nearly 6,000-square-foot private residence last summer. In fact, the job went so well, the contractor earned the Concrete Foundations Association's 1998 Basement of the Year Award (see sidebar on page **33**).

What was the key to Bontrager's success? The layout, according to co-owners Kevin and Duane Bontrager. This is the first and perhaps most important step when setting wall forms, especially those with nonstandard corner angles, and must be done correctly to avoid form and tie misalignment and troublesome gaps.

The challenges of nonstandard corners

All wall corners, regardless of the angle, cause the length of the inside formed wall to be shorter than the outside wall. This length difference depends on two factors: the size of the corner angle and wall thickness. For corner angles 90 degrees and larger, the difference between the inside and outside wall lengths gets smaller as the angle increases. But for corner angles less than 90 degrees, the difference gets larger as the angle gets smaller. Changes in wall thickness complicate the layout even more. As the wall thickness increases, so does the length difference between the inside and outside of the wall.

To accommodate these length differences, builders must use panels and fillers so the inside and outside

Multiple wall thicknesses and corner angles, uneven dimensions, and a brick ledge were some of the complexities and challenges of building this residential basement.

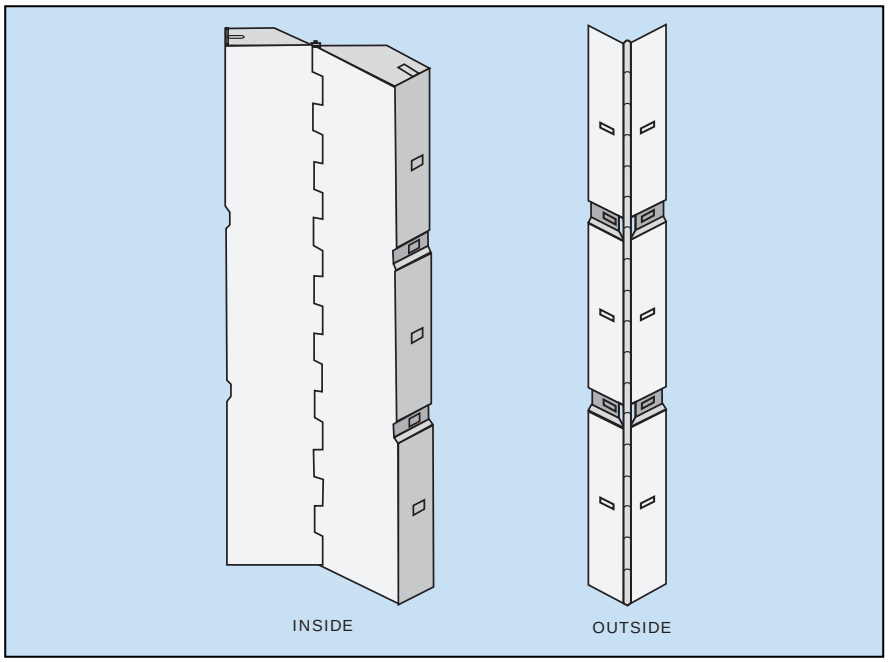

Figure 1. Typically, you can use inside hinged corners to form unusual angles down to 45 degrees and outside hinged corners to form angles from 5 to 135 degrees. Inside hinged corners can serve as outside corners when the inside corner angle is 110 to 180 degrees or the outside corner angle is 180 to 250 degrees.

wall forms come together without gaps. The correct filler dimension will enable the opposing wall panels to align properly so that ties fit easily. The real challenge, especially for nonstandard angles and varying wall thicknesses, is determining the filler size and whether to place the filler inside or outside the wall form to maintain proper wall and tie alignment.

Form manufacturers often supply inside and outside hinged corners for forming walls with nonstandard angles (Fig. 1), and they may provide tables showing filler dimensions for constant wall thicknesses and set angles, such as 120, 135, and 150 degrees. But using these hinged corners may not simplify layout of unusual corner angles. If the corner angle or wall thickness is not listed by the manufacturer, the contractor must determine the filler dimensions and may need to build the filler on the job. So for odd angles and wall thicknesses, laying out the corners may appear to be an unsolvable puzzle.

Solving the puzzle

The Bontragers made the pieces fit by laying out both the outside and inside wall lines directly on the footing. They then measured filler dimensions directly from the chalk lines on the footing. To use their procedure, shown in Figure 2 for a 142-degree inside corner and 218-degree outside corner, perform the following steps:

1. Directly on the footing, locate and snap chalk lines marking the outside and inside wall locations.
2. Set outside and inside hinged corners at the intersection of the wall lines.
3. Position a carpenter's square at the edge of either the inside or outside hinged corner to form a line perpendicular to the chalk lines. This perpendicular line indicates the correct location and alignment for the wall ties.
4. Determine if the fillers will be located inside or outside of the wall form by observing the perpendicular line formed by the carpenter's square and the edge positions of the hinged corners.
5. Measure the filler dimensions directly from the layout marked on the footing. The correct filler size is the distance from the perpendicular line formed by the carpenter's square to the edge of the hinged corner (Fig. 3).

For convenience and speed, the

CFA's Basement of the Year Award

Each year, the Concrete Foundations Association gives an award to the CFA member who builds the most difficult and challenging concrete basement, as judged by CFA's board of directors. In 1998, Bontrager Concrete Specialties received this honor for the project described here. The runners-up for the 1998 Basement of the Year Award were Epp Foundation Co., Lincoln, Neb.; Concrete Specialists Inc., Laporte, Ind.; Cardinal Concrete Co., Greensboro, N.C.; and UP Concrete & Gravel, Bark River, Mich.

Factors considered by the judges include:

- Number and angle of corners
- Variations in wall thickness and height
- Ledgers and blockouts
- Site conditions and placement methods
- Wall curves or other features that make the project a special challenge

If you have built or plan to build a complex, challenging basement during 1999 and are a CFA member, consider entering this year's competition. For more information, call CFA executive director Ed Sauter at 319-895-6940 (fax: 319.895.8830).

Figure 3. To determine the size of filler needed, measure along the chalk line from the carpenter's square to the edge of the hinged corner.

Bontragers use preconstructed, stocked fillers ¼ inch to 1½ inches wide in ¼-inch increments. The fillers consist of plywood shims used alone or in conjunction with standard manufactured 1-inch fillers. Using the preconstructed fillers and the procedure above makes laying out complex corner angles with different wall thicknesses fairly straightforward. This layout procedure will also work for T-wall intersections with constant or different wall thicknesses. When you are laying out bays or walls with several corner angles, the Bontragers recommend starting near the middle of the wall rather than starting at one end of the wall and working to the other end. This way, layout errors won't accumulate.

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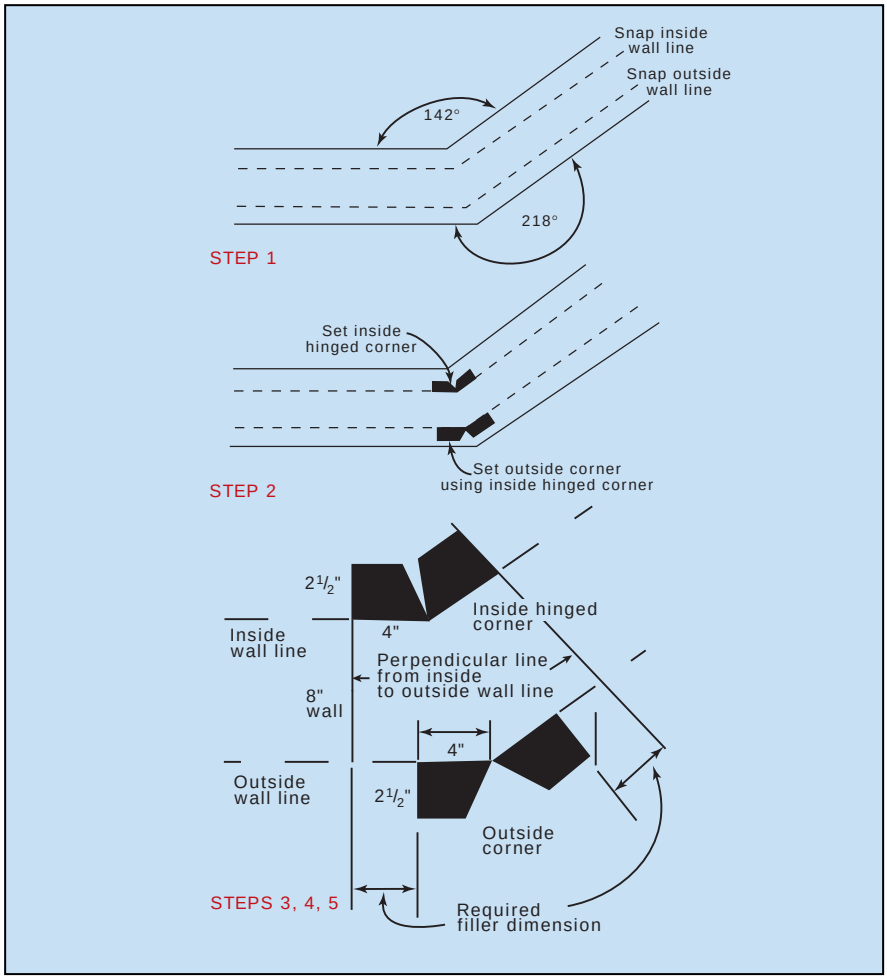

Figure 2. Layout procedure for nonstandard corner angles and wall thicknesses.